97-D-123, Structural Upgrades, Kansas City Plant, Kansas City, Missouri

(Changes from FY 2000 Congressional Budget Request are denoted with a vertical line [|] in the left margin.)

Significant Changes

None.

1. Construction Schedule History

	Fiscal Quarter				Total Estimated Cost ($000)	Total Project Cost ($000)
	A-E Work Initiated	A-E Work Completed	Physical Construction Start	Physical Construction Complete		
FY 1997 Budget Request (*Preliminary Estimate)*	2Q 1997	3Q 1999	3Q 1998	3Q 2003	18,000	19,800
FY 1998 Budget Request	2Q 1997	3Q 1999	3Q 1998	3Q 2003	18,000	19,800
FY 1999 Budget Request [a]	1Q 1998	3Q 1999	3Q 1998	3Q 2003	18,000	19,800
FY 2000 Budget Request	1Q 1998	4Q 1999	2Q 1999	2Q 2003	18,000	21,200
FY 2001 Budget Request *(Current Baseline Estimate)*	1Q 1998	4Q 1999	2Q 1999	2Q 2003	18,000	21,200

2. Financial Schedule

(dollars in thousands)

Fiscal Year	Appropriations	Obligations	Costs
1997	1,400	0	0
1998	0	594	0
1999	6,400	1,540	817
2000	4,282 [b]	9,948	8,383
2001	2,918	2,918	3,500
2002	3,000	3,000	2,900
2003	0	0	1,700
2004	0	0	700

[a] Reflected baseline changes to ensure that all areas within the Stockpile Management Restructuring Initiative (SMRI) footprint are repaired/reinforced.

[b] Original appropriation was $4,800,000. This was reduced by $18,000 for the FY 2000 rescission enacted by P.L. 106-113, and by $500,000 for an FY 2000 general reduction.

3. Project Description, Justification and Scope

This project is required to correct structural overstress caused by gravity loads and will reinforce masonry walls to resist seismic loading within the DOE controlled portion of the Bannister Federal Complex to ensure life safety. On December 16, 1993, a Kansas City Susceptibility Review and Walkdown was held at the Kansas City Plant (KCP) by Albuquerque Operations Office, and Headquarters. This review was initiated as a result of a September 1993 report by an outside structural consulting firm that documented two principal areas of concern: existing structural overstresses and numerous unreinforced interior masonry walls. It was determined during the review that the structural overstresses and unreinforced masonry walls findings were an immediate concern.

To provide an immediate response to initiate risk reduction and potential loss of government assets, structural modifications were incorporated into all ongoing projects which appreciably renovated affected areas. Deficiencies in the remainder of the plant not affected by on-going projects are being addressed in this line item submission.

The first part of this line item is required to provide structural overstress relief in accordance with current building code and DOE Order requirements to ensure life safety. This type of overstress is caused by gravity loads (dead loads, live load and snow load) and wind loading only. Overstressed locations will be repaired to reduce the possibility of structural failure and bring the structure into compliance with DOE Orders and codes.

The second part of this line item is required to reinforce masonry walls to resist the seismic loading up to a "500 year event." The existing masonry walls will fall at a "100 year event." Approximately 40 percent of the masonry walls in the DOE controlled part of the Federal Complex (upon completion of the Stockpile Management Restructuring Initiative Line Item) are not reinforced to resist seismic loading. Seismic codes were not in place when the KCP was constructed. Potential seismic overstresses have been identified because of the presence of many unreinforced masonry walls added to the building for fire protection purposes. Failure of these walls would constitute a life safety hazard in the event of seismic activity.

The Federal Complex is currently occupied by several Federal Government Agencies. Corrective activities will be performed in DOE controlled areas only, unless an item is identified through the engineering study that would affect both DOE and the General Services Administration. This project will include the following upgrades:

- Column ribs will be post tensioned on end bays to increase bending moment capacity. This will be done by tensioning two steel rods underneath the subject ribs. The rods will be anchored into the end bay roof beam and bolted through to the interior roof beam.
- Selected rib ends will be supported with steel suspenders and long threaded rods through the roof shell or saddles and fastened to the roof beams to increase rib shear capacity and overcome the member strength loss due to existing cracking caused by excessive shear loading.
- Roof shell openings will be reinforced with steel straps adjacent to openings and parallel to the barrel axis. This provides a means of externally reinforcing the thin concrete shell.
- The mezzanine roof slab will be reinforced with intermediate steel beams supported by the concrete roof support beams.

- Supplemental support will be provided to mezzanine concrete roof structure integrity. This would stop further deterioration of the shell.
- Roof shell cracks will be injected with epoxy to reestablish roof structure integrity. This would stop further deterioration of the shell.
- Structural steel blocking will be attached to the roof structure on each side of existing masonry walls. This will eliminate drift during seismic activity and ultimately failure of the walls independent of the remaining structure. This blocking would be spaced approximately 4 feet center to center. The blocking would consist of steel angles fastened to a horizontal surface with the vertical leg of the angle placed against the top of the masonry wall and flat plates fastened to vertical surfaces of the roof structure and lapped down over the top course of the masonry walls.
- Steel strong-backs will be installed adjacent to masonry walls. This strong-back will be a structural tube fixed to the building floor at the bottom of the wall and roof structure at the top. The wall would be bolted to the strong-backs at approximately 4 feet centers. The strong-backs themselves would be on 8 foot centers. This would prevent a tall wall from collapse during a seismic event that produced lateral movement normal to the wall.
- The top of free-standing masonry walls will be supported with roof structure mounted braces. These braces would then be mounted to a steel strut fastened to the roof.

Main Manufacturing Building Overstresses Under Gravity Loading:

- Roof Ribs - 4 percent of the ribs are overstressed.
- Roof Beams - < 1 percent of the beams are overstressed.
- Roof Shell With Openings - 34 percent of the roof shells are overstressed.
- Columns - 0 percent of the columns are overstressed.
- Basement Level Supported Floor Slab - 5 percent of the floor slab is overstressed.
- 2nd Level Supported Floor Slab - 6 percent of the floor slab is overstressed

Seismic events at KCP can be generated by two faults. The New Madrid Fault is approximately 250 miles east of the KCP. The New Madrid fault system extends 120 miles from the area of Charleston, Missouri and Cario, Illinois through New Madrid, Missouri and to Marked Tree, Arkansas. It crosses five state lines and crosses the Mississippi River in three places and the Ohio River in two places. The fault is active, averaging more than 200 measured events per year (1.0 or more on the Richter scale). Tremors large enough to be felt (2.5-3.0 on the Richter scale) are noted annually. Every 18 months the fault releases a shock of 4.0 or more capable of local minor damage. Magnitudes of 5.0 or greater occur about once per decade, can do significant damage, and can be felt in several states. A damaging earthquake along the fault of 6.0 or greater occurs about every 80 years with the last one in 1895. A major earthquake along the fault of 7.5 of greater happens every 200-300 years, with the last one in 1812. A quake of this magnitude would be felt throughout half of the United States. This information is based on a document titled "About the New Madrid Fault" from Southeast Missouri State University Center for Earthquake Studies, David Stewart, Director. The document is undated.

The other fault that could affect the KCP is the Humbolt Fault Zone (Nehemma Ridge) located approximately 80 miles west of Kansas City in the Manhattan-Wamego, Kansas area. The largest earthquake that has occurred in Kansas is a probable Richter magnitude of about 5.2-5.3, which occurred in 1867 and events of this size can be expected to occur every 100 years. An earthquake of Richter magnitude 6.0-6.5 at this fault is likely to occur on average once in about 1000 years. This information is based on a document titled "Kansas Geological Survey" from the University of Kansas on October 10, 1990 by Don W. Steeples, Ph.D., Seismologist and Deputy Director.

In March 1994, the KCP was placed in performance Category 1, based on an extensive study of mission dependency of specific KCP operations, Production Risk Evaluation Program, and the hazard assessment in the Site Safety Assessment. This recommendation was agreed to by Kansas City Area Office (KCAO), Albuquerque (AL) Operations Office, DOE-HQ, and AlliedSignal. A site specific Seismic Hazard Analysis was performed during the first quarter of FY 1994 by DOE-HQ for the KCP. This resulted in a reduction of the seismic zone factor from 0.15g to 0.06g. The Design Basis Earthquake (DBE) of 0.06g is comparable to a 500-year event. The former values are required by the 1994 Uniform Building Code for Zone 2A where the KCP is located. The lower seismic zone factor resulted in significant reduction in the calculations used in the analysis and has been taken into account in the cost estimate. The existing masonry walls are currently protected to a 100-year event.

The applicable DOE Orders and Codes that apply to this project are as follows:

- DOE Order 420.1, "Facility Safety."
- Executive Order 12941 "Seismic Safety of Existing Federally Owned or Leased Buildings."
- The American Institute of Steel Construction (A.I.S.C.), American Concrete Institute (A.C.I.), and Uniform Building Code (UBC) define analysis and design requirements for corrective actions.

The consequence of not funding this line item is a continued life safety risk due to structural overstresses and, in the event of seismic activity, potential failure of unreinforced masonry walls. This project is in accordance with current mission needs and is being coordinated with the Stockpile Management Restructuring Initiative.

Project Milestones:

FY 1998:	A-E Work Initiated	1Q
FY 1999:	A-E Work Completed	4Q
	Physical Construction Starts	2Q
FY 2003:	Physical Construction Complete	2Q

4. Details of Cost Estimate

(dollars in thousands)

	Current Estimate	Previous Estimate
Design Phase		
Preliminary and Final Design costs (Design Drawings and Specifications)	1,626	1,626
Design Management Costs (2.8% of TEC)	504	504
Project Management Costs (0.3% of TEC)	49	49
Total, Design Costs (12.1% of TEC)	2,179	2,179
Construction Phase		
Buildings	10,830	10,830
Standard Equipment	360	360
Inspection, Design and Project Liaison, Testing, Checkout and Acceptance	918	918
Construction Management (4.7% of TEC)	842	842
Project Management (1.1% of TEC)	195	195
Total, Construction Costs (73.0% of TEC)	13,145	13,145
Contingencies		
Design Phase (0.7% of TEC)	131	131
Construction Phase (14.1% of TEC)	2,545	2,545
Total, Contingencies (14.9% of TEC)	2,676	2,676
Total, Line Item Costs (TEC) [a]	18,000	18,000

5. Method of Performance

Design and inspection will be performed under a KCP negotiated architect-engineer subcontract. Construction will be accomplished by fixed-price contracts awarded on the basis of competitive proposals and administered by Allied Signal.

[a] The Conceptual Design Report was completed in June 1995. Escalation is calculated to the midpoint of each activity. Escalation rates were taken from the FY 1997 DOE escalation multiplier tables. Overhead rates were calculated at a factor of 14% for procurement and 77% for internal labor.

6. Schedule of Project Funding

(dollars in thousands)

	Prior Years	FY 1999	FY 2000	FY 2001	Outyears	Total
Project Cost						
Facility Cost						
Design	0	817	1,493	0	0	2,310
Construction	0	0	6,890	3,500	5,300	15,690
Total, Line item TEC	0	817	8,383	3,500	5,300	18,000
Total, Facility Costs (Federal and Non-Federal)	0	817	8,383	3,500	5,300	18,000
Other Project Costs						
Conceptual design cost	110	0	0	0	0	110
Other project-related costs	710	420	420	600	940	3,090
Total, Other Project Costs	820	420	420	600	940	3,200
Total, Project Cost (TPC)	820	2,420	8,803	4,100	6,240	21,200

7. Related Annual Funding Requirements [a]

(FY 2003 dollars in thousands)

	Current Estimate	Previous Estimate
Annual facility operating costs	0	0
Annual facility maintenance/repair costs	0	0
Total related annual funding (operating from FY 2003 through FY 2032)	0	0

[a] This project is to repair the structural elements of the KC Plant and there is no associated annual operating or maintenance cost associated with this project.